REMARKS

The Office Action of April 16, 2003 has been considered by Applicant and his attorneys. Applicant notes the entry of the substitute specification filed January 28, 2003.

Claim 2 was rejected under 35 U.S.C. 102(b) as anticipated by Halladay et al. Applicant has cancelled Claim 2.

Claim 1 stands rejected as being obvious over Gragnolati et al. or Halladay in view of Grice. Applicant respectfully traverses the grounds of rejection of claim 1. As stated in a previous Office Action, the Examiner agrees that neither the Gragnolati nor Halladay references teach or suggest the step of combining the outputs of the sensors to check that the sensor plurality is correct. Applicant urges that the combination of either of these two references with the Grice reference does not cure this deficiency in the teachings of the two primary references. The method disclosed by Grice is to test the sensors in a test circuit during the manufacturing stage, as described for example in column 2, lines 53-64. The Grice patent teaches a hydrophone array plurality test circuit to be used during the process of manufacturing the hydrophones before they leave the manufacturing area. The test circuit described by Grice does not suggest that the disclosed plurality test circuit could be or would be used during the process of seismic detection and measurement during actual seismic activity. Therefore, the Grice reference is not relevant to the specific steps recited in Applicant's claim 1.

The method described in the Grice reference is completely unsuitable for continuous, in situ testing of the sensors during the operation of the detector, which is an aim of the present invention, and is specifically recited in claim 1. For these reasons, Applicant submits that the combination of the Grice reference with the Halladay or Gragnolati references would still fail to teach the method of using a seismic detector to detect and measure seismic activity as specifically claimed in Applicant's claim 1. Therefore, Applicant submits that claim 1 is allowable over the combination of references applied by the Examiner.

Claim 3 stands rejected as being obvious over Gragnolati et al. or Halladay et al. in view

of Barr. As noted by the Examiner, the difference between Applicant's claim 3 and the Gragnolati or Halladay references is that Applicant's claim 3 specifies that the outputs of the four sensors are used to obtain an indication of motion in three-dimensions using a least square basis. Applicant's traverse the grounds of rejection of claim 3 on the grounds that the consideration of either of these two references with Barr fails to teach or suggest the combination of steps recited in claim 3.

Claim 3 specifically recites the step of using the outputs of all four working sensors to obtain an indication of motion in three-dimensions on a least squares basis. In contrast, the method disclosed in Barr does not use least squares to determine motion. Instead, the least squares method is used in the adaptive filter 508 of Barr to reduce noise from the noise sensor 506. (Fig. 5 of Barr.) In the Barr reference, only one motion sensor's output is fed into the adaptive filter 508, and it is the adaptive filter which applies the least squares, with another input provided by a noise sensor, as shown in Figure 5b of Barr. Therefore, the method of the Barr reference is inapplicable to producing a three-dimensional indication of motion, and therefore the disclosure of Barr does not render claim 3 obvious. For these reasons, Applicant's claim 3 is submitted as allowable over a combination of the Halladay or Gragnolati refernces in combination with Barr.

Claim 4 stands rejected as obvious in view of either Halladay or Gragnolati in combination with McCormick. Applicant specifically traverses the grounds of rejection of claim 4. The method recited in claim 4 specifically recites the step of checking that the outputs from the sensors are coherent. This inherently calls for a measurement of the signal to noise ratio. Applicant submits that the method disclosed by McCormick does not measure the coherence of the signals. Rather, the presence of high frequency noise is detected, which causes a light to activate if present. The distortion and noise measuring circuit of the McCormick reference uses an oscillator to produce a constant amplitude current signal. This signal is applied to a geophone, and the resulting geophone signal is sampled. The measuring circuit of McCormick measures

only the amplitude of the resulting harmonics. When the geophone signal is distorted, the distortion produces harmonics of the basic signal used for energizing the geophone. McCormick teaches, thus, that measuring the amplitude of any harmonics produced by the geophones provides a measurement of the distortion. McCormick also states that noise may be measured in a similar manner by measuring the high frequency signals produced which are an indication of the noise produced by loose coil connects or other malfunctions. See McCormick, column 2, lines 43-62. The McCormick reference does not teach or suggest the measurement of coherence, or signal to noise ratio, and therefore Applicant contends that the disclosure of McCormick does not cure the deficiencies in the Gragnolati and Halladay primary references as applied by the Examiner to claim 4. For the above reasons, Applicant submits that claim 4 is allowable as presently recited.

In response to the Applicant's comments at paragraph 10 of the Office Action, claim 5 has been amended to delete the expression "(or sensitivities)" in both lines 4 and 6 of claim 5. Also, although claim 6 has been previously indicated as allowable, the expression "(or sensitivities)" has been removed from the last line of claim 6.

In summary, claims 1 and 3-6 remaining in the application are allowable over the applied references for the reasons cited above. Applicant therefore submits that this application is in condition for allowance.

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Respectfully submitted,

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